

(vi) The average deceleration between  $t_2$  and  $t_3$  shall be not less than 20g and not more than 34g.

(4) Allow the neck to flex without contact of the head or neck with any object other than the pendulum arm.

(5) Allow a time period of at least 1 hour between successive tests of the head and neck.

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**§ 572.18 Thorax.**

(a) The thorax consists of the part of the torso shown in assembly drawing SA 103C 001 by number SA 103C 030 and conforms to each of the applicable drawings listed under this number on drawing SA 103C 002, sheets 10 and 11.

(b) When impacted by a test probe conforming to § 572.21(a) at 13 fps in accordance with paragraph (c) of this section, the peak resultant accelerations at the location of the accelerometers mounted in the chest cavity in accordance with § 572.21(c) shall be not less than 50g and not more than 70g. The acceleration-time curve for the test shall be unimodal at or above the 30g level and shall lie at or above the 30g level for an interval not less than 2.5 milliseconds and not more than 4.0 milliseconds. The lateral acceleration shall not exceed 5g.

(c) *Test procedure.* (1) With the dummy seated without back support on a surface as specified in § 572.21(h) and oriented as specified in § 572.21(h), adjust the dummy arms and legs until they are extended horizontally forward parallel to the midsagittal plane. The joints of the limbs are adjusted at any setting between 1g and 2g, which just supports the limbs' weight when the limbs are extended horizontally forward.

(2) Establish the impact point at the chest midsagittal plane so that it is 1.5 inches below the longitudinal centerline of the bolt that attaches the top of the ribcage sternum to the thoracic spine box.

(3) Adjust the dummy so that the tangent plane at the surface on the thorax immediately adjacent to the designated impact point is vertical and parallel to the face of the test probe.

(4) Place the longitudinal centerline of the test probe to coincide with the designated impact point and align the test probe so that at impact its longitudinal centerline coincides within 2 degrees with the line formed by intersection of the horizontal and midsagittal planes passing through the designated impact point.

(5) Impact the thorax with the test probe so that at the moment of impact the probe's longitudinal centerline falls within 2 degrees of a horizontal line in the dummy midsagittal plane.

(6) Guide the probe during impact so that it moves with no significant lateral, vertical or rotational movement.

(7) Allow a time period of at least 20 minutes between successive tests of the chest.

**§ 572.19 Lumbar spine, abdomen and pelvis.**

(a) The lumbar spine, abdomen, and pelvis consist of the part of the torso assembly shown by number SA 103C 030 on drawing SA 103C 001 and conform to each of the applicable drawings listed under this number on drawing SA 103C 002, sheets 10 and 11.

(b) When subjected to continuously applied force in accordance with paragraph (c) of this section, the lumbar spine assembly shall flex by an amount that permits the rigid thoracic spine to rotate from its initial position in accordance with Figure 18 of this subpart by 40 degrees at a force level of not less than 34 pounds and not more than 47 pounds, and straighten upon removal of the force to within 5 degrees of its initial position.

(c) *Test procedure.* (1) The dummy with lower legs removed is positioned in an upright seated position on a seat as indicated in Figure 18, ensuring that all dummy component surfaces are clean, dry and untreated unless otherwise specified.

(2) Attach the pelvis to the seating surface by a bolt C/328, modified as shown in Figure 18, and the upper legs at the knee axial rotation joints by the attachments shown in Figure 18. Tighten the mountings so that the pelvis-lumbar joining surface is horizontal and adjust the femur ball-flange screws at each hip socket joint to 50 inch pounds torque. Remove the head and

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the neck and install a cylindrical aluminum adapter 2.0 inches in diameter and 2.80 inches long in place of the neck.

(3) Flex the thorax forward 50 degrees and then rearward as necessary to return to its initial position in accordance with Figure 18 unsupported by external means.

(4) Apply a forward pull force in the midsagittal plane at the top of the neck adapter, so that at 40 degrees of the lumbar spine flexion the applied force is perpendicular to the thoracic spine box. Apply the force at any torso deflection rate between 0.5 and 1.5 degrees per second up to 40 degrees of flexion but no further; continue to apply for 10 seconds the force necessary to maintain 40 degrees of flexion, and record the highest applied force at that time. Release all force as rapidly as possible and measure the return angle 3 minutes after the release.

## § 572.20 Limbs.

The limbs consist of the assemblies shown on drawing SA 103C 001 as Nos. SA 103C 041, SA 103C 042, SA 103C 051, SA 103C 052, SA 103C 061, SA 103C 062, SA 103C 071, SA 103C 072, SA 103C 081, SA 103C 082, and conform to each of the applicable drawings listed under their respective numbers of the drawing SA 103C 002, sheets 12 through 21.

## § 572.21 Test conditions and instrumentation.

(a)(1) The test probe used for head and thoracic impact tests is a cylinder 3 inches in diameter, 13.8 inches long, and weighing 10 lbs., 6 ozs. Its impacting end has a flat right face that is rigid and that has an edge radius of 0.5 inches.

(2) The head and thorax assembly may be instrumented with a Type A or Type C accelerometer.

(i) Type A accelerometer is defined in drawing SA-572 S1.

(ii) Type C accelerometer is defined in drawing SA-572 S2.

(b) *Head accelerometers.* Install one of the triaxial accelerometers specified in § 572.21(a)(2) on a mounting block located on the horizontal transverse bulkhead as shown in the drawings sub-referenced under assembly SA 103C 010 so that the seismic mass centers of

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each sensing element are positioned as specified in this paragraph, relative to the head accelerometer reference point located at the intersection of a line connecting the longitudinal centerlines of the transfer pins in the side of the dummy head with the midsagittal plane of the dummy head.

(1) The sensing elements of the Type C triaxial accelerometer are aligned as follows:

(i) Align one sensitive axis parallel to the vertical bulkhead and coincident with the midsagittal plane, with the seismic mass center located 0.2 inches dorsal to, and 0.1 inches inferior to the head accelerometer reference point.

(ii) Align the second sensitive axis with the horizontal plane, perpendicular to the midsagittal plane, with the seismic mass center located 0.1 inches inferior, 0.4 inches to the right of, and 0.9 inches dorsal to the head accelerometer reference point.

(iii) Align the third sensitive axis so that it is parallel to the midsagittal and horizontal planes, with the seismic mass center located 0.1 inches inferior to, 0.6 inches dorsal to, and 0.4 inches to the right of the head accelerometer reference point.

(iv) All seismic mass centers are positioned with  $\pm 0.05$  inches of the specified locations.

(2) The sensing elements of the Type A triaxial accelerometer are aligned as follows:

(i) Align one sensitive axis parallel to the vertical bulkhead and coincident with midsagittal planes, with the seismic mass center located from 0.2 to 0.47 inches dorsal to, from 0.01 inches inferior to 0.21 inches superior, and from 0.0 to 0.17 inches left of the head accelerometer reference point.

(ii) Align the second sensitive axis with the horizontal plane, perpendicular to the midsagittal plane, with the seismic mass center located 0.1 to 0.13 inches inferior to, 0.17 to 0.4 inches to the right of, and 0.47 to 0.9 inches dorsal of the head accelerometer reference point.

(iii) Align the third sensitive axis so that it is parallel to the midsagittal and horizontal planes, with the seismic mass center located 0.1 to 0.13 inches inferior to, 0.6 to 0.81 inches dorsal to, and from 0.17 inches left to 0.4 inches